



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

August 30, 2013

WELL WORK PERMIT

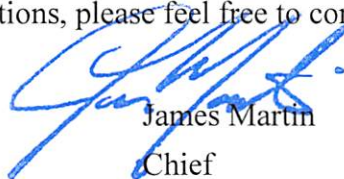
Horizontal 6A Well

This permit, API Well Number: 47-6900172, issued to CHESAPEAKE APPALACHIA, L.L.C., is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.



James Martin
Chief

Operator's Well No: ROY FERRELL OHI 210H
Farm Name: FERRELL, ROY E.

API Well Number: 47-6900172

Permit Type: Horizontal 6A Well

Date Issued: 08/30/2013

Promoting a healthy environment.

PERMIT CONDITIONS

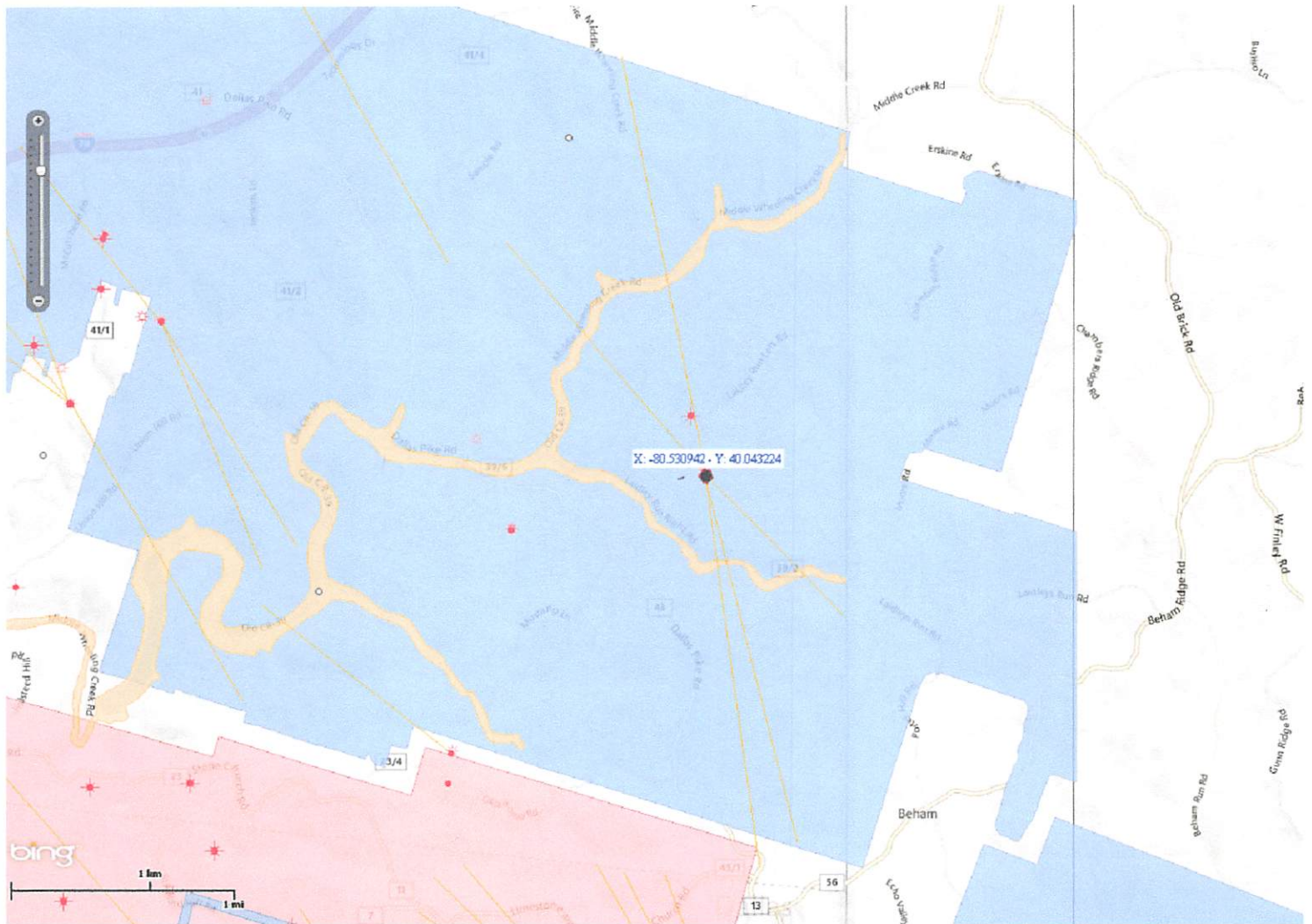
West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
2. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the fill material shall be within plus or minus 2% (unless soil test results show a greater range of moisture content is appropriate and 95% compaction can still be achieved) of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
3. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
4. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
5. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
6. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
7. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

Map from a Flex Viewer application

Powered by ArcGIS



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Drilling into abandoned
mine @ 691'

- Larva Cooper

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: Chesapeake Appalachia, LLC 494477557 69- Ohio 7- Triadelphia 648- Valley Grove
Operator ID County District Quadrangle

2) Operator's Well Number: Roy Ferrell OHI 210H Well Pad Name: Roy Ferrell OHI Pad

3 Elevation, current ground: 1196' Elevation, proposed post-construction: 1196'

4) Well Type: (a) Gas ☒ Oil ☐
Other ☐
(b) If Gas: Shallow ☐ Deep ☐
Horizontal ☒

5) Existing Pad? Yes or No: Yes

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):

Target formation-Marcellus, Target top TVD- 6630', Target base TVD- 6690', Anticipated thickness- 60', Associated Pressure -4177

7) Proposed Total Vertical Depth: 6,660'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 15,250'

10) Approximate Fresh Water Strata Depths: 324'

11) Method to Determine Fresh Water Depth: from a water well~4000' WNW of the pad

12) Approximate Saltwater Depths: 800'

13) Approximate Coal Seam Depths: 644'

14) Approximate Depth to Possible Void (coal mine, karst, other): 691' void abandoned mine

15) Does land contain coal seams tributary or adjacent to, active mine? No.

16) Describe proposed well work:

Drill and stimulate any potential zones between and including the Benson to the Marcellus. **If we should encounter a void, place basket above and below
void area - balance cement to bottom of void and grout from basket to surface. Run casing not less than 20' below void nor more than 50' below void.
(*If freshwater is encountered deeper than anticipated it must be protected, set casing 50' below and cts)

17) Describe fracturing/stimulating methods in detail:

Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along
the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface.
The well is produced through surface facilities consisting of high pressure production units, vertical separation units, water and oil storage tanks.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 11.0

19) Area to be disturbed for well pad only, less access road (acres): 7.0

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20)

CASING AND TUBING PROGRAM

TYPE	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft.</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill -up (Cu. Ft.)</u>
Conductor	20"	New	J-55	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	J-55	54.5#	740'	740'	680 SX/CTS
Coal	9 5/8"	New	J-55	40#	2200'	2200'	820 SX/CTS
Intermediate	7"	New	P-110	20#	If Needed	If Needed	If Needed/As Needed
Production	5 1/2"	New	P-110	20#	15,250'	15,250'	Lead 1,140 sx Tail 1500 sx/100' inside intermediate
Tubing	2 3/8"	New	N-80	4.7#	Approx. 7325'	Approx. 7,325'	
Liners							

MJK 8/22/2013

TYPE	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield</u>
Conductor	20"	30"	0.25	2120	15.6 ppg	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	15.6 ppg	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	15.6 ppg	1.19/50% Excess
Intermediate	7"	8 3/4"	.0317	4360	15.6 ppg	1.19/50% Excess
Production	5 1/2"	8 3/4"	0.361	12360	15.6 ppg	1.20/15% Excess
Tubing	2 3/8"	4.778"	0.190			
Liners						

PACKERS

Kind:	10K Arrowset AS1-X			
Sizes:	5 1/2"			
Depths Set:	Approx. 6,197'			

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21) Describe centralizer placement for each casing string. _____

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

22) Describe all cement additives associated with each cement type. _____

**Please see attached sheets for Chemical Listing of Cement & Additives for Chesapeake Energy wells.

23) Proposed borehole conditioning procedures. _____

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

*Note: Attach additional sheets as needed.

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<u>Chemical Name</u>	<u>CAS Number</u>	<u>% Concentration Used</u>
Fuller's earth (attapulgate)	8031-18-3	0.2% BWOC
Polypropylene glycol	25322-69-4	
polyethylene terephthalate	25038-59-9	0.125 lb/sk
calcium chloride	10043-52-4	2% BWOC
polyethylene terephthalate	25038-59-9	1 lb/bbl
bentonite	1302-78-9	20 lb/bbl
Fuller's earth (attapulgate)	8031-18-3	0.2% BWOC
Polypropylene glycol	25322-69-4	
polyethylene terephthalate	25038-59-9	0.125 lb/sk
sodium chloride	7647-14-5	10% BWOW
chrystalline silica	14808-60-7	0.15% BWOC
bentonite	1302-78-9	20 lb/bbl
polyethylene terephthalate	25038-59-9	1 lb/bbl
product classified as non-hazardous.		0.05 gal/sk
product classified as non-hazardous		0.01 gal/sk
polypropylene glycol	25322-69-4	0.02 gal/sk
Carbohydrate	proprietary	1 lb/bbl
Silica Organic Polymer	proprietary	0.1 gal/bbl
barium sulfate	7727-43-7	310 lb/bbl
fatty acid amine	proprietary	
ethoxylated alcohol	proprietary	
glycerol	56-81-5	
2,2'-Iminodiethanol	111-42-2	1 gal/bbl
aliphatic amide polymer	proprietary	0.35% BWOC
non-crystalline silica	7631-86-9	6% BWOC
boric acid	10043-35-3	0.8% BWOC
Fuller's earth (attapulgate)	8031-18-3	
Polypropylene glycol	25322-69-4	0.2% BWOC
chrystalline silica	14808-60-7	
metal oxide	proprietary	0.2% BWOC
sulphonated synthetic polymer	proprietary	
formaldehyde (impurity)	50-00-0	0.3% BWOC
Fuller's earth (attapulgate)	8031-18-3	
Polypropylene glycol	25322-69-4	0.2% BWOC
aliphatic amide polymer	proprietary	0.35% BWOC
Sodium Polynaphthalene Sulfonate	9008-63-3	
Sodium Sulfate	7757-82-6	0.25% BWOC

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chrystalline silica	14808-60-7	
metal oxide	proprietary	0.2% BWOC
chrystalline silica	14808-60-7	0.2% BWOC
Carbohydrate	proprietary	proprietary
Silica Organic Polymer	proprietary	proprietary
barium sulfate	7727-43-7	7727-43-7
fatty acid amine	proprietary	proprietary
ethoxylated alcohol	proprietary	proprietary
glycerol	56-81-5	56-81-5
2.2'-Iminodiethanol	111-42-2	111-42-2

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		Well Name: Roy Ferrell OHI 210H		Drilling Rig: N/A	
				Directional Drilling: N/A	
Drilling Engineer:	TBD	Formation:	Marcellus	Drilling Mud:	N/A
Superintendent:	N/A	County, State:	Ohio, WV	Cement Surface:	N/A
Asset Manager:	N/A	Surface Latitude:	40.043149	Surface Longitude:	-80.531148
Geologist:	N/A	BH Latitude:	40.027056	BH Longitude:	-80.515356
Land:	N/A	KB Elevation:	1214'	Ground Elevation:	1196'
				Wellhead:	N/A
				AFE #:	N/A

Cement: 70° F
Tail: 680 sx
15.6 ppg / 1.19 yld
Top C 100 sx
15.6 ppg / 1.19 yld
50% Excess
Pump-time: 4 hours

Cement: 83° F
Tail: 820 sx
15.6 ppg / 1.19 yld
50% Excess
Pump-time: 4 hours
Top C 100 sx
15.6 ppg / 1.19 yld

17-1/2" Air / Mist
12-1/4" Air / Mist
8-3/4" Air Dust

2,200' - 6,405'

8-1/2" SOBM
Curve 6,405' - 15,046'
MW: 12 - 13
Vis 45 - 65
HTHP 6-8 (SOBM)
ES > 600
LGS < 4

Wellhead Equipment

Tree Description	
Tubing Head **	Blanking Cap
'B' Section	11" x 5M x 7-1/16" 10M
'A' Section	9-5/8" SOW x 11" 5M

**** Space out such that Blanking Cap is no more than 30" above grade.**

Casing Detail

	Size	Wt	Grd	Conn.	From:	To:
Surface	13.375	54.5 #	J-55	STC	0'	740'
Interm	9.625	40 #	J-55	LTC	0'	2,200'
Prod	5.5	20 #	P-110	GBCD	0'	15,046'

Report any water or gas flows. Catch liquid sample if possible.

Casing Design

	Size	ID	Coll	Burst	Tens	MU torq
Surface	13.375	12.615	1130	2740	514	5140
Interm	9.625	8.835	2570	3950	520	5200
Prod	5.5	4.778	12200	12360	641	8530

Surface Nudge for Anti-Collision purposes.

Directional Drilling Details								
Section	TMD	Inc.	Azimuth	TVD	BUR	DLS	+N/-S	+E/-W
Surface	0.00'	0.00	0.00	0.00'	0.00	0.00	0.0'	0.0'
Surface	100'	0.00	0.00	100'	0.00	0.00	0.0'	0.0'
Surface	200'	0.00	0.00	200'	0.00	0.00	0.0'	0.0'
Surface	300'	0.00	0.00	300'	0.00	0.00	0.0'	0.0'
Surface	525'	0.00	0.00	525'	0.00	0.00	0.0'	0.0'
KOP1	2,300'	0.00	0.00	2,300'	0.00	0.00	0.0'	0.0'
Hold	3,656'	27.11	47.28	3,606'	2.00	2.00	213.5'	231.3'
KOP2	6,505'	27.11	47.28	6,142'	0.00	0.00	1,094.5'	1,185.2'
Landing Pt	7,325'	89.30	157.42	6,641'	7.58	12.00	754.8'	1,582.8'
TD	15,046'	89.30	157.42	6,735'	0.00	0.00	-6,373.8'	4,547.2'
VS Plane				157.42	VS Length		7,631.25'	

Lateral Length ==> 7,721.00'

Plat Date 5/30/13

Logging Program

Run	Log Type	Interval
1	TBD	TBD
2	TBD	TBD

Mudlogger operational at Surface

Formation Depths (TVD)

BASE BIG INJUN	2,043'
GENESEO	6,438'
TULLY	6,468'
HAMILTON	6,496'
MARCELLUS	6,629'
ONONDAGA	6,674'

Cement: 122° F
Lead: 1,140 sx
15.6 ppg / 1.20 yld
Tail: 1,500 sx
15.6 ppg / 1.20 yld
15% Excess
Pump-time: 6 hours

PBHL 5.5"
TMD: 15,046'
TVD: 6,735'
Inclination: 89.30 deg

Geologic Target: 6,640' TVD @ 0° VS w/ 0.70 degrees/100 ft Down-dip

Gyro the 1st well on the pad at KOP.
Ensure all Surveys are referenced to Grid North!!

Drawn by: TBD
Date: 8/15/2013

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STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

**CONSTRUCTION AND RECLAMATION PLAN AND SITE REGISTRATION APPLICATION FORM
GENERAL PERMIT FOR OIL AND GAS PIT WASTE DISCHARGE**

Operator Name Chesapeake Appalachia, LLC OP Code 494477557

Watershed Upper Ohio South Quadrangle 648- Valley Grove

Elevation 1196' County 69- Ohio District 7- Triadelphia

Description of anticipated Pit Waste: Closed loop system in place at this time - cuttings will be taken to a permitted landfill.

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes xx No

Will a synthetic liner be used in the pit? . If so, what mil.?

Proposed Disposal Method For Treated Pit Wastes:

- ☐ Land Application
- ☐ Underground Injection (UIC Permit Number 2D0072539/ 2D0413175/ 2D0610306/ 2D0610317)
- ☐ Reuse (at API Number at next anticipated well, API# will be included with the WR-34/DDMR &/or permit addendum)
- ☐ Off Site Disposal (Supply form WW-9 for disposal location)
- ☐ Other (Explain Flow back fluids will be put in steel tanks and reused or taken to a permitted disposal facility.)

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air and salt saturate mud

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Base

Additives to be used? see attached sheets

Will closed loop system be used ? yes

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

-If left in pit and plan to solidify what medium will be used? Cement, lime,

-Landfill or offsite name/permit number? Meadowfill SWF-1032, SS Grading SWF-4902, Northwestern SWF-1025

Short Creek 1034/WW0109517 / CID28726 , Arden Landfill 100172, Carbon Limestone 28726/CID 28726, American 02-12954, Country Wide 38390/CID 38390, Pine Grove 13688

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature [Signature]

Company Official (Typed Name) Danielle Southall

Company Official Title Regulatory Tech I

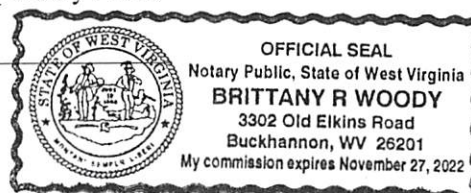
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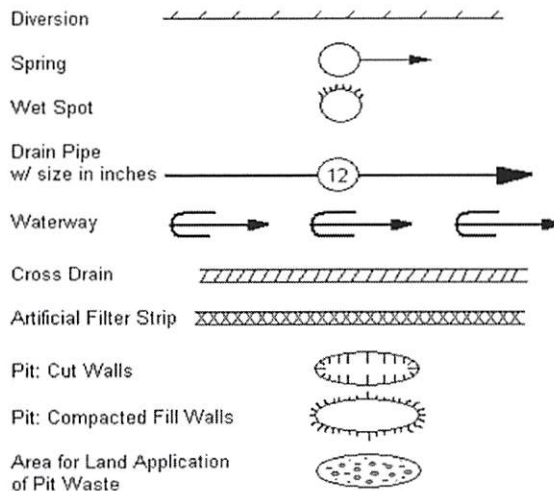
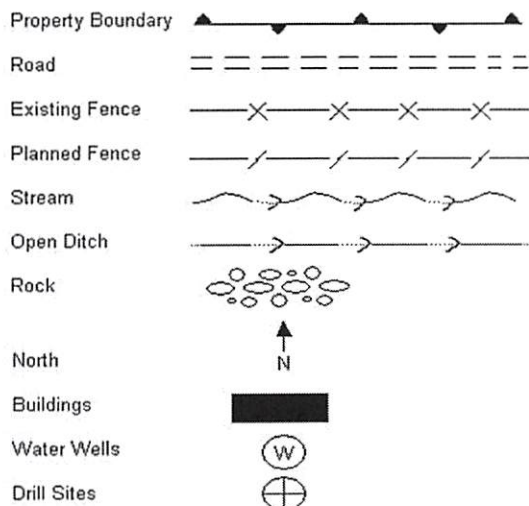
Subscribed and sworn before me this 4th day of January, 20 13

Brittany R. Woody

My commission expires 11/27/28

Notary Public





Proposed Revegetation Treatment: Acres Disturbed 10 +/- Prevegetation pH _____

Lime as determined by pH test min. 2 Tons/acre or to correct to pH 6.5

Fertilizer (10-20-20 or equivalent) 500 lbs/acre (500 lbs minimum)

Mulch Hay/Straw 2.5 Tons/acre

Seed Mixtures

Seed Type	Area I lbs/acre
White Clover	15
Red Top	15
Orchard Grass	20

Seed Type	Area II lbs/acre
White Clover	15
Red Top	15
Orchard Grass	20

Attach:
Drawing(s) of road, location, pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Gary J. Kuntz

Comments: _____

William Plunkett
1-8-13

Title: Oil and Gas Inspector

Date: 1/8/2013

Field Reviewed?

(☒) Yes

() No

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JUN 7 2013



Water Management Plan: Primary Water Sources



WMP- 01397

API/ID Number:

047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Important:

For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary);
- Identification of sensitive aquatic life (endangered species, mussels, etc.);
- Quantification of known existing demands on the water supply (Large Quantity Users);
- Minimum flows required by the Army Corps of Engineers; and
- Designated stream uses.

Based on these factors, DEP has provided, for each intake location (and origination point for purchased water), a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

DEP is aware that some intake points will be used for mutiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interepreted as total withdrawal limits for each location over the specified date range regardless of how many wells are supported by that intake.

For all purchased water intakes, determinations of water availability are made at the original source intake location. It is the responsibility of the Oil and Gas Operator, not the seller, to cease withdrawal of water from the seller when flows are less than the minimum gauge reading at the stream gauge referenced by the Water Management Plan in order to protect stream uses.

Note that the determinations made herein are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times. Approval to withdrawal is contingent upon permission from the land owner. It is the responsibility of the operator to secure and maintain permission prior to any withdrawals.

The operator is reminded that 24-48 hours prior to withdrawing (or purchasing) water, DEP must be notified by email at DEP.water.use@wv.gov.

APPROVED AUG 23 2013

Source Summary

WMP- 01397

API Number:

047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Stream/River

Source **Ohio River WP 1 (Beech Bottom Staging Area)** Brooke Owner: **Brownlee Land Ventures**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000		40.226889	-80.658972

☒ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): **6,000** Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

Source **Little Wheeling Creek WP 1 (Rt. 40 Staging Area)** Ohio Owner: **JDS Investments, LLC**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000		40.078324	-80.591145

☐ Regulated Stream? Ref. Gauge ID: 3112000 WHEELING CREEK AT ELM GROVE, WV

Max. Pump rate (gpm): **2,000** Min. Gauge Reading (cfs): **64.80** Min. Passby (cfs) **2.83**

DEP Comments:

Source **Middle Wheeling Creek @ Anderson Withdrawal Site** Brooke Owner: **Paul & Verna Anderson**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000		40.04409	-80.55348

☐ Regulated Stream? Ref. Gauge ID: 3112000 WHEELING CREEK AT ELM GROVE, WV

Max. Pump rate (gpm): **2,500** Min. Gauge Reading (cfs): **60.34** Min. Passby (cfs) **4.17**

DEP Comments:

Source Summary

WMP-01397

API Number:

047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Purchased Water

● Source **Ohio River @ J&R Excavating** Marshall Owner: **J&R Excavating**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000	1,890,000	39.998509	-80.737336

☒ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

● Source **The Village of Valley Grove** Ohio Owner: **The Village of Valley Grove**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000	720,000	-	-

☒ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

● Source **Ohio County PSD** Ohio Owner: **Ohio county PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000	720,000	-	-

☒ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

Source Detail

WMP- 01397

API/ID Number: 047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Source ID: 23095 Source Name Ohio River @ J&R Excavating
J&R Excavating

Source Latitude: 39.998509

Source Longitude: -80.737336

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Marshall

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm)

☐ Endangered Species? ☒ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☒ Regulated Stream? Ohio River Min. Flow

☐ Proximate PSD?

☒ Gauged Stream?

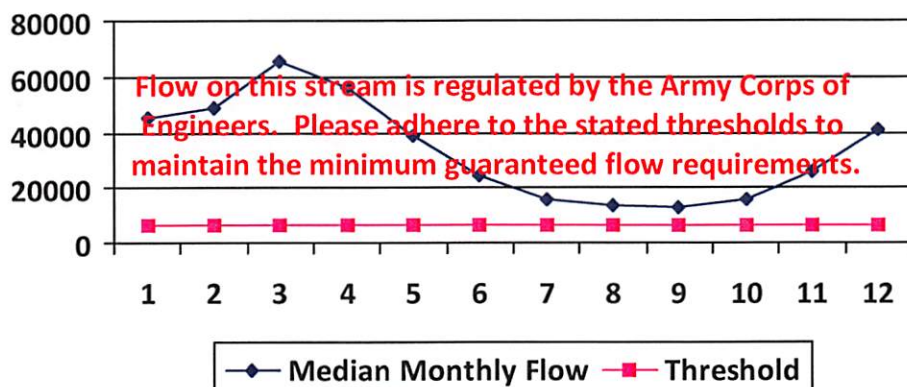
Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs): 0.00

Downstream Demand (cfs): 0.00

Pump rate (cfs):

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01397

API/ID Number: 047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Source ID: 23097 Source Name: The Village of Valley Grove
The Village of Valley Grove

Source Latitude: -
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

☐ Endangered Species? ☒ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☒ Regulated Stream? Ohio River Min. Flow

☒ Proximate PSD? Wheeling Water Department

☒ Gauged Stream?

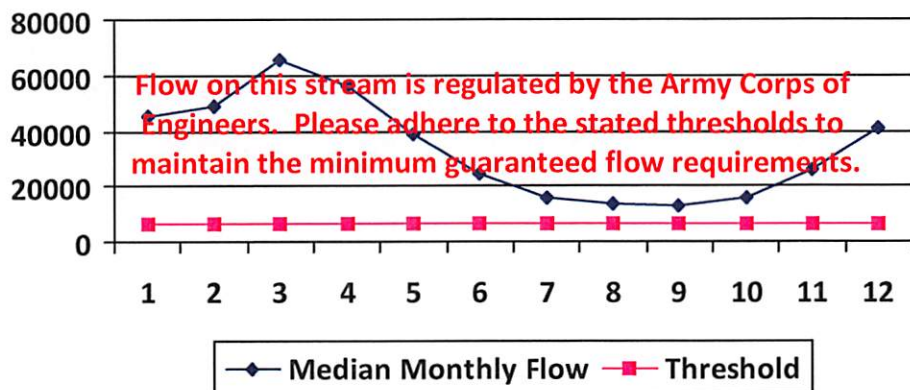
Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs):

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01397

API/ID Number: 047-069-00172

Operator: Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Source ID: 23098 Source Name: Ohio County PSD
Ohio county PSD Source Latitude: -
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

☐ Endangered Species? ☒ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☒ Regulated Stream? Ohio River Min. Flow

☒ Proximate PSD? Wheeling Water Department

☒ Gauged Stream?

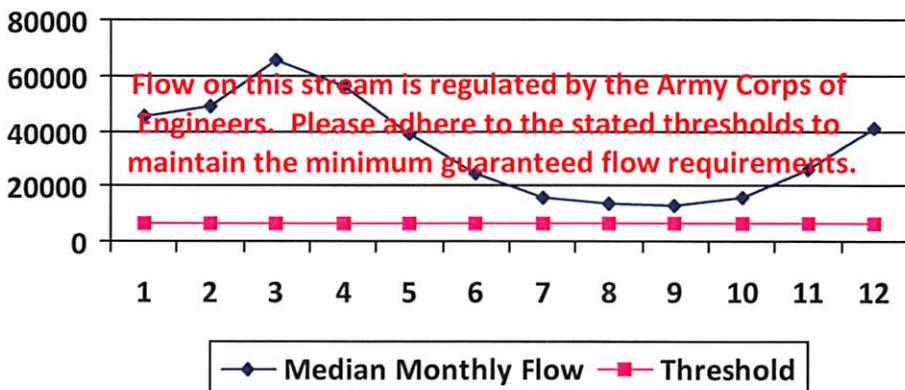
Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs):

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01397

API/ID Number: 047-069-00172

Operator: Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Source ID: 23089 Source Name: Ohio River WP 1 (Beech Bottom Staging Area)
Brownlee Land Ventures

Source Latitude: 40.226889

Source Longitude: -80.658972

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Brooke

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm): 6,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

☐ Endangered Species? ☒ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☒ Regulated Stream? Ohio River Min. Flow

☒ Proximate PSD? Beech Bottom Water Dept.

☒ Gauged Stream?

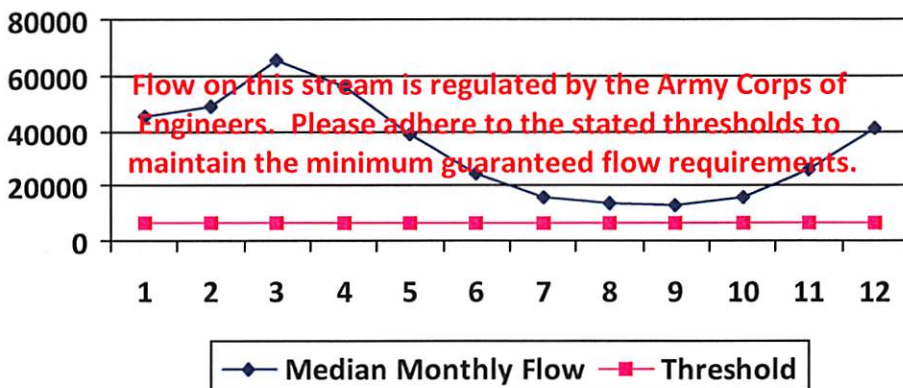
Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs): 13.37

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01397

API/ID Number: 047-069-00172

Operator: Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Source ID: 23090 Source Name: Little Wheeling Creek WP 1 (Rt. 40 Staging Area)
JDS Investments, LLC

Source Latitude: 40.078324

Source Longitude: -80.591145

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 13.94 County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm): 2,000

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

☐ Endangered Species? ☒ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☐ Regulated Stream?

☐ Proximate PSD?

☐ Gauged Stream?

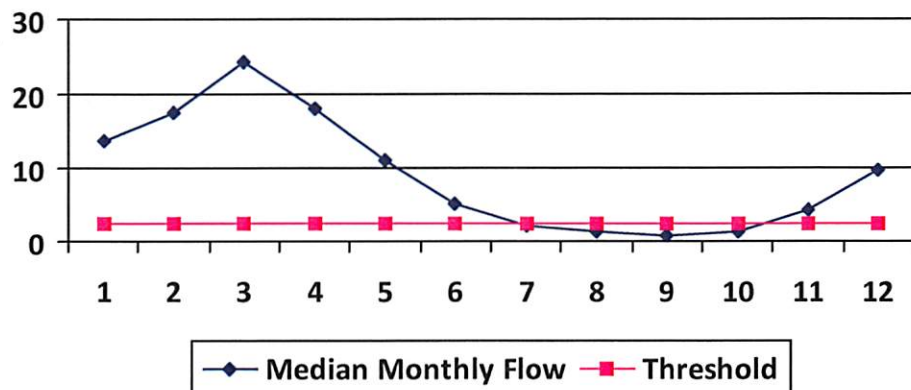
Reference Gaug: 3112000 WHEELING CREEK AT ELM GROVE, WV

Drainage Area (sq. mi.): 281.00

Gauge Threshold (cfs): 38

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	13.81	10.62	3.55
2	17.62	10.62	7.36
3	24.44	10.62	14.18
4	18.14	10.62	7.88
5	11.06	10.62	0.80
6	5.03	10.62	-5.23
7	2.22	10.62	-8.03
8	1.30	10.62	-8.96
9	0.83	10.62	-9.43
10	1.37	10.62	-8.89
11	4.31	10.62	-5.95
12	9.77	10.62	-0.49

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): 1.89

Upstream Demand (cfs): 3.34

Downstream Demand (cfs): 0.00

Pump rate (cfs): 4.46

Headwater Safety (cfs): 0.47

Ungauged Stream Safety (cfs): 0.47

Min. Gauge Reading (cfs): 64.80

Passby at Location (cfs): 2.83

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01397

API/ID Number:

047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Source ID: 23091

Source Name

Middle Wheeling Creek @ Anderson Withdrawal Sit
Paul & Verna Anderson

Source Latitude: 40.04409

Source Longitude: -80.55348

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 20.54

County:

Brooke

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm): 2,500

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm): 0

☐ Endangered Species? ☒ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☐ Regulated Stream?

☐ Proximate PSD?

☐ Gauged Stream?

Reference Gaug

3112000

WHEELING CREEK AT ELM GROVE, WV

Drainage Area (sq. mi.)

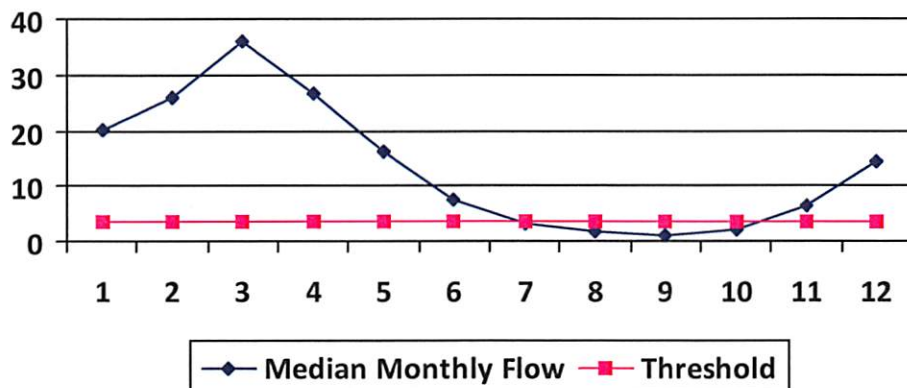
281.00

Gauge Threshold (cfs):

38

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	20.35	9.74	10.73
2	25.97	9.74	16.35
3	36.01	9.74	26.39
4	26.73	9.74	17.11
5	16.30	9.74	6.68
6	7.42	9.74	-2.20
7	3.28	9.74	-6.34
8	1.92	9.74	-7.70
9	1.22	9.74	-8.40
10	2.02	9.74	-7.60
11	6.35	9.74	-3.27
12	14.40	9.74	4.78

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): 2.78

Upstream Demand (cfs): 0.00

Downstream Demand (cfs): 0.00

Pump rate (cfs): 5.57

Headwater Safety (cfs): 0.69

Ungauged Stream Safety (cfs): 0.69

Min. Gauge Reading (cfs): 62.57

Passby at Location (cfs): 4.17

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.



Water Management Plan: Secondary Water Sources



WMP- 01397

API/ID Number

047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Purchased Water

Source ID:	23096	Source Name	Pennsylvania American Water Public Water Provider		Source start date:	9/1/2013
					Source end date:	9/1/2014
Source Lat:		Source Long:		County		
Max. Daily Purchase (gal)	720,000	Total Volume from Source (gal):	6,552,000			
DEP Comments:	Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.					

WMP-01397

API/ID Number

047-069-00172

Operator:

Chesapeake Energy

Roy Ferrell OHI 210H - 836178

Important:

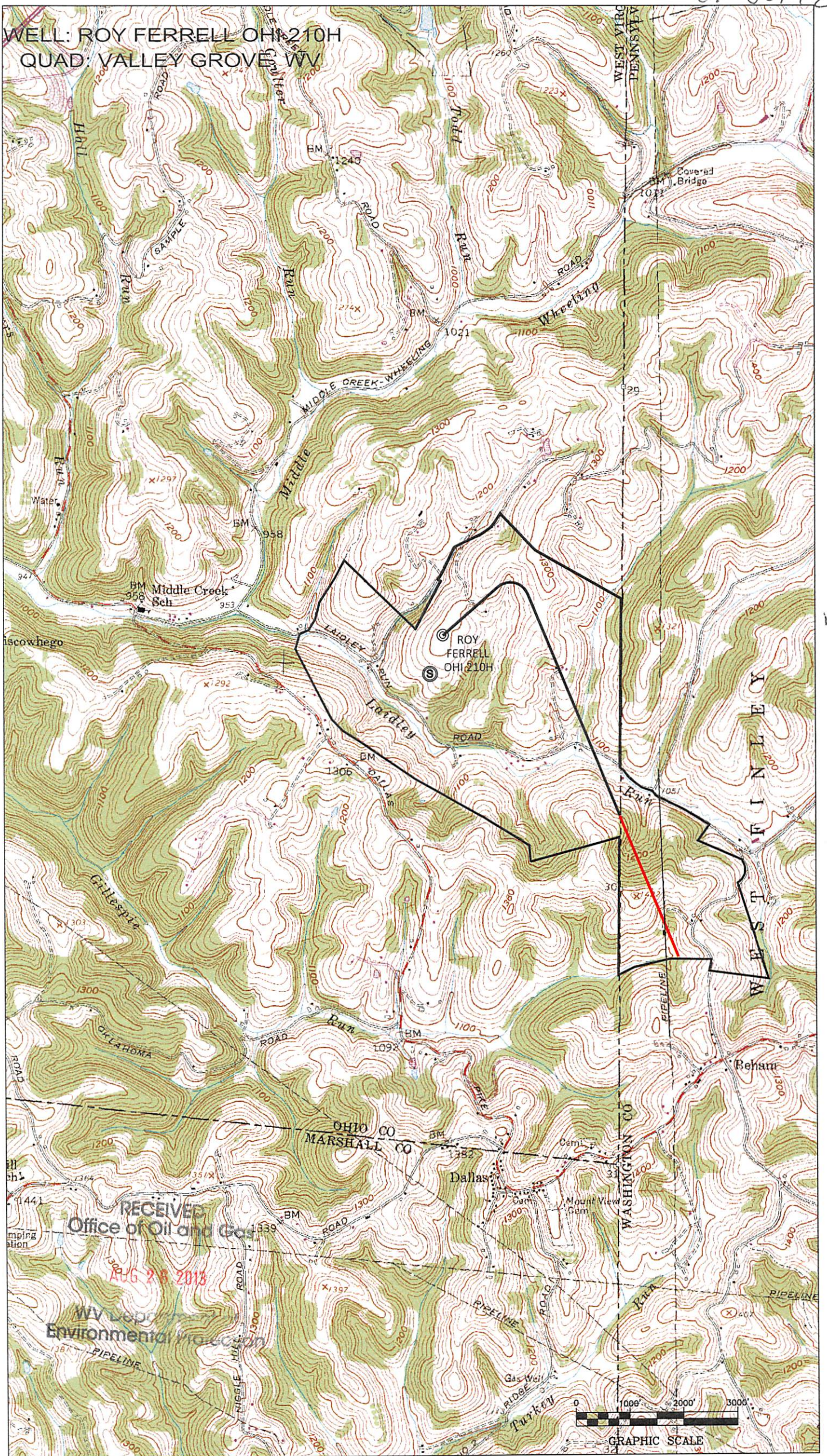
For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Recycled Frac Water

Source ID:	23099	Source Name	Chad Glauser OHI 10H		Source start date:	9/1/2013
					Source end date:	9/1/2014
Source Lat:		Source Long:		County		
Max. Daily Purchase (gal)		Total Volume from Source (gal):	1,638,000			
DEP Comments:						

WELL: ROY FERRELL OHI 210H
QUAD: VALLEY GROVE WV



TOP HOLE (UTM 83)

N) 4432660.0
E) 540013.5

BOTTOM HOLE (UTM 83)

N) 4430881.0
E) 541370.5



CHARLES L. FERRELL
81.79 TOTAL ACRES
DEED BOOK / PAGE
W79/92
LEASE NUMBER
1-313920-000
TAX MAP AND PARCEL
T15-3

EDWARD AND
LAURA BECK
88 TOTAL ACRES
LEASE NUMBER
1-264287-000
1-264292-000
1-264289-000
1-264288-000
1-264290-000
1-264291-000
TAX MAP AND PARCEL
T15-8

REFERENCES

REBAR SET

REBAR SET

ROY FERRELL
OHI 210H

NTS

REFERENCES TO
PROPOSED HORIZONTAL
WELLS SURFACE LOCATIONS

API NUMBERS
1H = 069-00111 10H = 069-00114
3H = 069-00090 201H = 069-00157
5H = 069-00112 205H = 069-00159
8H = 069-00069 210H = 069-00172

NTS

069-00022
N 13°12'01" W
1,461'
PLUGGED

Existing Wells
within 3,000'
NTS

REFERENCE NOTES

Boundaries as shown taken
from deeds, tax maps and
field locations. A full boundary
survey is not expressed nor implied.
All bearings are based on true north.
Ownership taken from public records
Ohio County, West Virginia
FEBRUARY 2011
State Plane Coordinates &
NAD 83 Lat/Long by differential
submeter mapping grade GPS
Drafted by: E.A.M.

SURFACE
HOLE

JOHN A. AND C.L. FRYE
67.698 TOTAL ACRES
LEASE NUMBER
1-324747-000
TAX MAP AND PARCEL
T15-10

JOHN A. AND C.L. FRYE
2 TOTAL ACRES
TAX MAP AND PARCEL
T15-10.2

JAMES P. POWELL JR. AND
LISA EBANKS POWELL
50.999 TOTAL ACRES
LEASE NUMBER
201038922
TAX MAP AND PARCEL
68-03-15.01

ROBERT MILTON UPTON
33.00 TOTAL ACRES
LEASE NUMBER
37-022331-000
201308182
TAX MAP AND PARCEL
68-04-02

DAVID A. EVANS
63.06 TOTAL ACRES
LEASE NUMBER
201007912
TAX MAP AND PARCEL
68-03-16

FILE #: CHE 034

DRAWING #: 1975

SCALE: PLAT = (1"=1400')
TICK MARK = (1"=2000')

MINIMUM DEGREE

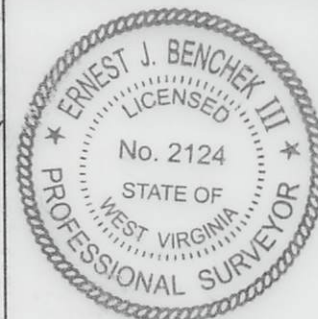
OF ACCURACY: 1/200

PROVEN SOURCE SUBMETER MAPPING
OF ELEVATION: GRADE GPS

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS
PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND
BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY
LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY
THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed:

L.L.S. #2124 : Ernest J. Benckek III



(+) DENOTES LOCATION OF WELL ON
UNITED STATES TOPOGRAPHIC MAPS
WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

Well Type: ☐ Oil ☐ Waste Diposal ☐ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: WHEELING CREEK

COUNTY/DISTRICT: OHIO/TRIADELPHIA

SURFACE OWNER: ROY E. FERRELL

OIL & GAS ROYALTY OWNER: ROY E. FERRELL

LEASE NUMBERS:

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒
PLUG OFF FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐
CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY):

TARGET FORMATION: MARCELLUS

WELL OPERATOR : CHESAPEAKE APPALACHIA, LLC.

ADDRESS: PO BOX 18496

CITY: OKLAHOMA CITY STATE: OK ZIP CODE: 73154-0496

DATE: AUGUST 21, 2013

OPERATOR'S WELL #: ROY FERRELL OHI 210H

API WELL #: 47 69 172 H6A
STATE COUNTY PERMIT

ELEVATION : 1,205'

QUADRANGLE: VALLEY GROVE WV.

ACREAGE: 202.31 +/-

ACREAGE: 591.30 +/-

ESTIMATED DEPTH: TVD: 6,729' TMD: 14,546'

DESIGNATED AGENT : ERIC B. GILLESPIE

ADDRESS: Po Box 6070

CITY: CHARLESTON STATE: WV ZIP CODE: 25301